Clinical Update

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Corticosteroids in Dentistry

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Corticosteroids are used to treat a wide variety of medical disorders (1, 2). In dentistry, they are used primarily to decrease post-operative edema and manage oral inflammatory diseases. Dental patients with a history of corticosteroid use may require special consideration prior to receiving dental treatment. The purpose of this Clinical Update is to review the use of corticosteroids in dentistry and the special considerations for dental patients who present with a history of corticosteroid use.

Physiology of Corticosteroids: Corticosteroids are chemically similar to endogenous cortisol which is important in protein, carbohydrate and fat metabolism, maintenance of vascular reactivity and adapting the body to stress (1,2). The adrenal gland normally produces about 24-30 mg of cortisol each day, but may produce up to 300 mg of cortisol during times of extreme stress (3,4,5). Cortisol secretion is regulated by circadian rhythm, a stress-related response and a negative feedback mechanism between the adrenals, pituitary and hypothalamus (3). When supraphysiologic doses of corticosteroids (> 30 mg cortisol equivalent) are administered for over 2 weeks, the hypothalamic-pituitary-adrenal (HPA) axis may become suppressed and may take up to 12 months to recover. However, a functional ability to respond to stress has been demonstrated to return within 14-30 days (3). Cortisol and corticosteroids have a variety of effects on many systems.

Anti-inflammatory (6). Cortisol stabilizes lysosomal membranes, decreases capillary permeability and decreases white blood cell chemotaxis and phagocytosis. It also inhibits the activation and proliferation of T cells, antibody producing plasma cells and cytokine production.

Carbohydrate and protein metabolism (6). Cortisol decreases the peripheral utilization of glucose, stimulates gluconeogenesis in the liver from amino acids and inhibits protein synthesis in the muscle. This elevates blood glucose and liver glycogen.

Lipid metabolism is affected by corticosteroids as fat is redistributed to the back, shoulders, abdomen, and face results in a cushinoid effect with a "moon facies" and "buffalo hump."

Electrolyte and water balance. Corticosteroids stimulate reabsorption of sodium and excretion of potassium, calcium, and hydrogen ions. Thus, prolonged corticosteroid use may lead to hypernatremia, hypokalemia, hypocalcemia and alkalosis.

Endocrine effects. Corticosteroids may provide feedback inhibition of pituitary ACTH and TSH.

Contraindications (2,7,8). Corticosteroids should not be routinely used in patients with a history of chronic infection such as tuberculosis, viral infections, peptic ulcers, diabetes mellitus, osteoporosis, psychiatric disorders, cataracts, and hypertension.

Adverse effects. Hyperglycemia, myopathy (muscle weakness and wasting), osteoporosis, osteonecrosis, growth suppression, peptic ulcers (decreases secretion of PGE2 which protects the gastric mucosa), increased intraocular pressure, cataracts, and edema may result (8). CNS side effects include psychosis, euphoria, sleeplessness and restlessness. Corticosteroids may also predispose to infections, acne, weight gain, poor wound healing, thinning of the skin, and hirsutism. Candidosis is commonly seen and antifungal treatment may be required.

Suppression of the HPA axis occurs as a result of long-term supraphysiologic doses of corticosteroids. In these patients, extreme stress or sudden withdrawal of corticosteroids may result in adrenal crisis due to the lack of endogenous cortisol required to maintain homeostasis (1-3). Adrenal crisis may feature severe hypotension, weakness, dehydration, gastrointestinal symptoms, and even death (1).

Clinical Applications of Corticosteroids

Corticosteroids are available in various strengths and potencies. Relative potency (Tables 1,2) is a useful way of comparing different corticosteroids. Hydrocortisone (cortisol) is the standard for comparison.

Table 1:Common topical corticosteroid ointments (9)

Potency	Drug	Strength (%)
Low	Hydrocortisone	2.5
	Betamethasone valerate	0.01
	Triamcinolone	0.025
Medium	Triamcinolone	0.1
High	Clobetasol	0.05
	Fluocinonide	0.05
	Triamcinolone	0.5

Table 2: Corticosteroid comparison (2).

Drug	Equivalent dose (mg)	Relative potency
Hydrocortisone	20	1
Prednisone	5	4
Prednisolone	5	4
Methylprednisolone	4	5
Triamcinolone	4	5
Dexamethasone	0.75	25

Control of Edema. Corticosteroids are beneficial in reducing post-surgical edema, which may cause post-operative pain. (10,11). They are indicated for those procedures likely to produce post-operative edema (i.e. bony impactions, osseous periodontal surgeries). Alexander has suggested the regimens below (11):

Intramuscular. For an **a.m. case-** Give two (4-mg) dexamethasone (DMA) tablets at bedtime the night prior to surgery.

For p.m. cases-Give two (4 mg) DMA tablets the morning of surgery ***and for both a.m. and p.m. cases*** inject 8-12 mg DMA acetate IM into the masseter, internal pterygoid, or deltoid muscle ***at the time of surgery.***

Intravenous: Administer 12mg dexamethasone sodium phosphate IV. An oral pre-operative and a post-operative dose is not necessary.

Oral: AM Cases- Administer two 4-mg DMA tablets the night before surgery. **PM Cases**- Give four 4-mg tablets of DMA preoperative in the morning followed by four 4-mg tablets of DMA 3 hours preoperatively and two tablets of DMA at bedtime followed by 4 tabs of DMA the first postoperative morning.

Control of oral diseases. Oral lichen planus, pemphigus, pemphigoid, erythema multiforme, recurrent aphthous stomatitis and allergic reactions may respond favorably to topical or systemic corticosteroids (7,8). Corticosteroids should be avoided in viral lesions such as herpes simplex because of the potential for exacerbation of the infection due to immune system suppression.

When the severity of disease impacts the patient's ability to concentrate, eat and function, aggressive treatment with 40 to 60 mg of oral prednisone daily should be considered. The patient should be instructed to take prednisone each morning with a meal until the symptoms are resolved. Morning dosing mimics the body's diurnal release of endogenous cortisol and minimizes the side effects. No tapering dose of the medication is required if treatment is expected to be less than 2 weeks. Tapering should be considered if therapy will exceed 2 weeks. Localized or mild vesiculobullous conditions can be treated topically when the lesions are few and easily accessible. Topical corticosteroid ointments and gels such as fluocinonide, triamcinolone and clobetasol are applied 3-4 times daily with a finger or cotton tip applicator. These agents may be compounded by a pharmacist with equal parts plain Orabase® to facilitate adhesion and improve contact time. In the oral mucosa, topical steroids are poorly absorbed systemically and usually do not suppress the HPA axis (12). Clobetasol, an ultrapotent corticosteroid is an exception and is not recommended for more than 2 weeks of use due to increased risk of HPA axis suppression. When lesions are confined to the gingiva, custom fitted trays may be fabricated and filled with fluocinonide gel and worn for 15 minutes *qid* (13). Corticosteroid creams are better indicated for dermatologic use and should be avoided intraorally. When lesions are too numerous or inaccessible for topical treatment, dexamethasone elixir (0.5 mg/5ml) may be utilized as an oral rinse. The patient should vigorously rinse for 3-4 minutes *qid* after meals and expectorate.

Recalcitrant lesions may require direct injection of corticosteroids around the margins of the lesion. An injection of 0.5-1.0 ml dexamethasone phosphate (4 mg/ml) or triamcinolone (10mg/ml) can be given twice a week until healing occurs (8,13).

Prior or current history of corticosteroid use. Patients with a history of current or previous glucocorticoid therapy may require supplemental corticosteroids prior to stressful dental procedures. (1,3,8). If the patient is receiving or has undergone therapy with supraphysiologic doses (>2 weeks) within the past 30 days, the HPA axis may be suppressed and supplementation should be provided (3). Supplemental doses of corticosteroids should be given on the morning of the appointment and correlated to the level of expected stress exerted on the patient and should be equivalent to no more than 300 mg of cortisol (3). To minimize risk of adrenal crisis, effective long acting anesthesia should be obtained along with consideration for sedation in the apprehensive patient and appropriate post-operative analgesics (3). If the patient's corticosteroid therapy was terminated over 30 days ago, then no supplementation is required.

Patient undergoing glucocorticoid therapy on an alternate day dosing schedule do not require supplementation on the "off day." Ideally, patients should be treated on the off day, as the functional stress response is greater then. Topical and inhaled corticosteroids do not require supplementation. When in doubt, consult the patient's physician or err on the side of supplementation.

Scenario 1: Patient requiring extractions took a 7 day course of 20 mg. of prednisone for exacerbation of asthma one week ago.
Action: No supplementation required. Even though the dose was supraphysiologic, the course of time it was taken was less than 2 weeks.

Scenario 2: Patient requiring extractions is taking 10 mg of prednisone for the past year to treat rheumatoid arthritis.
Action: This patient's HPA axis is probably suppressed due to supraphysiologic dose of corticosteroids for longer than 2 weeks. Supplement with at least 100 mg of cortisol equivalent (25 mg prednisone) in the morning on the day of the surgery.

Scenario 3: Patient requiring extractions is taking 2.5 mg of prednisone daily for the past 3 months to treat his psoriasis.
Action: No supplementation required. Even though the patient has been on prednisone for over 2 weeks, the dose is subphysiologic and will not adversely impact his stress response.

Scenario 4: Patient requiring extractions was previously taking 50 mg of prednisone for Crohn's disease. He was on a 6-month course of prednisone but took his last dose 5 weeks ago.
Action: No supplementation needed. A functional stress response returns in 14-30 days after the last dose of supraphysiologic steroids.

Scenario 5: Patient requiring extractions is taking 75 mg of prednisone daily for the past 8 weeks to treat pemphigus.
Action: No supplementation needed as 75 mg of prednisone is the maximum dose equivalent to 300 mg of endogenous cortisol.

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